

PROTON NMR STUDIES OF NEARLY HOMOIONIC FORMS OF CLINOPTILOLITE. James. A. Happe, Raymond. L. Ward, and Roberto. T. Pabalan[†], Lawrence Livermore National Laboratory, University of California, Livermore, California 94550 and [†]Center for Nuclear Waste Regulatory Analyses, Southwest Research Institute, San Antonio, Texas 78238-5166.

The proton NMR lineshape of water in the zeolitic isomorphs clinoptilolite and heulandite approximate a Gaussian and (reduced splitting) Pake doublet respectively*. Different cations are the distinguishing chemical characteristic of the two isomorphs. Clinoptilolite has Na and K as the most prevalent cations, whereas heulandite has Ca. Nearly homoionic Na-, K-, and Ca- clinoptilolite have been prepared by ion-exchange methods in order to investigate the effects of the cation on the proton spectrum of clinoptilolite. Each sample has been studied by proton NMR at 300 MHz using single-pulse Bloch and quadecho acquisitions both as a function of NMR parameters and heat treatment. Each homoionic form of clinoptilolite reveals structure in the proton spectrum that is not observed in the naturally occurring zeolite. In addition, the log of the amplitude of the quadecho response is a linear function of the pulse spacing rather than quadratic as observed for common dipolar echoes of spin 1/2 pairs such as $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. This data will also be discussed in terms of cation water interactions.

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